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## A NEW SEPTOBASIDIUM ON PINUS STROBUS \*

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(WITH PLATES 11-13)

The writer is indebted for the opportunity to present this article to the kindness of Dr. E. A. Burt. Two years ago specimens of a species which appeared to be a *Septobasidium*, commonly found upon the bark of the eastern white pine, were sent to Dr. Burt for identification. In reply he stated that this fungus had never been found sporulating and suggested that an effort be made to find it in a fertile condition. The writer immediately began collecting the fructifications from different localities in New England, and later extended the field of observations to Wisconsin. Collections were made throughout that summer and fall into November and beginning again early the next spring. In the summer of 1920 at North Conway, N. H., August was ushered in with moist or rainy weather which lasted through the middle of the month. A collection made after about two weeks of this sort of weather showed that the probasidia had germinated and sporulation was taking place in abundance. The material was sent to Dr. Burt and he very magnanimously returned it to the writer for study and description. The name given to the fungus is *Septobasidium pinicola*.

This species of *Septobasidium* is a northern form growing at least as far north as northern New Hampshire, whereas most of the species of the genus are tropical or subtropical. *Septobasidium*

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*pseudopedicellatum* is the only other species which appears in the temperate zone in the United States. The known geographical range of *S. pinicola* is thus far rather puzzling. The writer knows of its occurrence in all the New England states but Rhode Island and in New York, but no collections in Canada or the middle western white pine states are known. The writer is quite sure that he has collected it in Wisconsin, but the collection can not be found, nor can collections by others in Michigan, Wisconsin, or Minnesota be located. On the other hand, Dr. Weir, of this office, informs the writer that this same *Septobasidium* occurs also upon *Pinus monticola* in the western states and cites one of his collections from Idaho. No further data are at hand, however, relative to its distribution west of the Mississippi or of the possibility of its occurrence upon *Pinus lambertiana*. It is very likely to be found abundantly in certain loci in pine woods in the east, and occasionally dozens of the fruit bodies may be seen upon a single tree. They have been found only very rarely on trees under 3 inches in diameter at the base, but have been collected, however, on very small twigs of larger trees.

The fruit bodies of *S. pinicola* occur only upon the smooth bark of white pines. They are especially common in the angles made by the lower sides of the branches with the trunk (Plate 11). As far as the tree is concerned, the fungus is a pure epiphyte. It lives entirely superficially, and not only does not injure any living tissue, but does not even penetrate the outer bark (Plate 13, fig. 1). It is not associated with wounds, pitch flow, blister rust cankers, or any other fungus, although it is often overgrown with a lichen, especially when old. The fruit bodies do not bear any decided relation to the points of the compass. In some spots in the woods it has appeared that there were more fructifications upon the north-east half of the trunk than upon the southwest half, but this is by no means universally true. The sporophores are found more commonly on well-shaded portions of the trees, but they are occasionally found where they are exposed to the direct rays of the sun.

Other species of the genus *Septobasidium* are known to be associated with scale insects (1, pp. 321-322; 2; 3), and the status of *S. pinicola* in this respect is at once brought in question. An

entomogenous relation is suggested not only by this fact, but also by its manner of growth and the common occurrence of a scale insect upon the pine. cursory observations show that such a relation exists. If a fruit body is carefully separated from the pine bark, the remains of the scale insects can readily be seen on the lower surface or on the pine bark, either as brown skeletons or cases, or white-lined pockets in which the insects were inclosed (Plate 12, fig. 1). If small fruit bodies 2-3 mm. large are examined, the white bodies of the insects are easily made out imbedded in the hyphae, and examination of these under the microscope leaves no doubt as to their identity or their relation of the fungus to them. The insects are overgrown and intergrown with mycelium of the fungus, which can be determined to be within their bodies (Plate 12, fig. 2). The hyphae in the youngest insects were hyaline (see fig. 2) and on the older ones were dark like that of the context.

The fructifications are more or less ashy colored and are conspicuous against the greenish bark of the pine. In structure *S. pinicola* differs from most of the species of *Septobasidium* described, inasmuch as the plainly 3-layered condition discernible in most of them is not present (Plate 13, fig. 1). There is more or less of a matting of the dark hyphae close to the substrate, but it is irregular and lacunar much as is the substance above it. The remainder of the context is made up of loosely intertwined hyphae running obliquely upward, leaving empty locules and giving the whole a spongy appearance. The hymenium is formed by branching of these hyphae which form the hyaline probasidia, being thus lighter in color than the rest of the structure. The subglobose to pyriform probasidia, both at and below the surface, germinate to form straight, hyaline, three-celled spore-bearing organs. Stages in the germination of the probasidia are shown in plate 13, figure 2. The spores are born singly from each of the three cells, and, as far as could be determined, in succession and acropetally. Figure 3 of plate 13 shows this very well. This is in line with Burt's observations with the other species (1, pp. 319-20).

**Septobasidium pinicola** sp. nov.

Fructification resupinate, effused, coriaceous, in general circular in shape, more or less concentrically sulcate, separable from substratum, roughly tomentose to strigose, army brown to natal-brown when dry, the margin light-drab to cinnamon-drab, strigose; in structure lacunar, spongy, 1-1.8 mm. thick, individual hyphae under the microscope clay-color to tawny-olive, thick-walled, even, 3-3.5  $\mu$  in diameter, loosely interwoven so as to form a spongy structure with locules, branching to form a lighter colored hymenium about 80-110  $\mu$  thick; probasidia terminal or lateral, hyaline, pyriform to subglobose, 10-15  $\times$  15-17  $\mu$ , throughout hymenium; spore-bearing organs straight, hyaline, 54-66  $\times$  6-7  $\mu$ , 3-septate, growing from probasidia and projecting above hymenium; spores hyaline, simple, curved, 14-17.5  $\times$  3-3.5  $\mu$ , borne singly from each of 3 cells of probasidium, acropetally as far as observed.

Fructification 3-60 mm. but more commonly 10-35 mm. in diameter, 1-1.8 mm. thick.

Type in herbarium of Walter H. Snell, No. 559; co-types in herbaria of Missouri Botanical Garden, No. 57093, and Forest Pathology, No. 36832.

On bark of living *Pinus strobus* in New England and New York and probably co-extensive with the habitat of this host; also on *Pinus monticola* in Idaho. Found sporulating after prolonged moist and rainy period in August.

Collections known:

On *Pinus strobus*.

Maine:

<sup>1</sup> Standish: in F. P. No. 20639, coll. by W. H. Chadbourne; same in Mo. Bot. Gard. comm. by Dr. Perley Spaulding.

Kennebunkport: in Mo. Bot. Gard. No. 5091 and in Farlow Herb., coll. by Mrs. A. M. Pier, March and April.

<sup>1</sup> Mount Vernon: in Mo. Bot. Gard., coll. by Dr. W. J. Morse, comm. by Dr. Perley Spaulding, March.

Kittery Point: in Farlow Herb., coll. by R. T. Baxter, spring.

Brunswick: in Herb. WHS No. 499, June.

New Hampshire:

North Conway: in Herb. WHS No. 559 and No. 601; F. P. No. 36832, Aug. and Sept.; several coll. in Mo. Bot. Gard., comm. by the writer and one by Dr. A. S. Rhoads, Sept.

Welch's Island, Lake Winnepesaukee: WHS No. 502, June.

Vermont:

Townshend: in Mo. Bot. Gard. No. 55603 and in Farlow Herb., coll. by W. G. Hastings, comm. by Dr. Perley Spaulding.

<sup>1</sup> Specimens not examined by the writer.

## Massachusetts:

Middleboro: WHS No. 597, August.

Wareham: WHS No. 598, August.

## New York:

Lewis: WHS No. 604, coll. by Dr. L. H. Pennington, August.

On *Pinus monticola*.

## Idaho:

St. Joe National Forest: coll. by Dr. J. R. Weir.

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3. ———. Fungi parasitic on scale insects. Trans. Brit. Myc. Soc. 1920, 7: 18-40. 1921.

## EXPLANATION OF PLATES

## PLATE 11

*Septobasidium pinicola* on bark of living *Pinus strobus*. Two fructifications are shown at the union of the branches with the trunk, where they often occur. Two-thirds natural size. Photograph by the author.

## PLATE 12

Fig. 1. Lower surface of a young fructification of *Septobasidium pinicola*, showing remains of scale insects. The two groups of large bodies at the upper and lower right-hand corners of the fruit body are large ovoid or spheroid chitinous shells, dark-brown in color. The other crater-like depressions, mostly in the left half of the fruit-body, are white waxy cases enclosing scale insects such as is shown in fig. 2, which was removed from the hollow marked by the large dark spot in the center.  $\times 10$ .

Fig. 2. Scale insect removed from lower surface of fruit-body shown above, showing hyaline mycelium within the body of the insect.  $\times 143$ .

Photomicrographs by the author.

## PLATE 13

Fig. 1. Discontinuous cross-section of portion of fruit-body of *Septobasidium pinicola*, showing relation to host tissue.

Fig. 2. Paraphysis-like organs (young probasidia?) in hymenium.

Fig. 3. Probasidia, one of them dark-colored and thicker-walled.

Fig. 4. Germinating probasidia showing stages in the formation of spore-bearing organs.

Fig. 5. Spore-bearing organs, arising from probasidia, one showing successive acropetal formation of spores. The spore on the lower sterigma is not yet quite ripe, the second sterigma has just formed, and the apical one is forming.

Fig. 6. Spores.

Fig. 7. Chlamydospore-like bodies found in the hymenium. Whether or not these belonged to this fungus or to some invading mold could not be determined.